

## Phased Approach - Minimize Costs/Maximize Return

**STEP 1: Conduct Needs Assessment to Baseline Current Program**


- Reality Check - Redefine program strategies and objectives
- Review existing program information
- Perform site visit
- Evaluate engineering systems, procedures, organization, information management/reporting, compliance issues, cost drivers...
- Identify opportunities for improvement
- Evaluate optimization alternatives
- Perform cost/benefit analysis
- Develop optimization recommendations


**STEP 2: Develop Long-Term Optimization and Management Plan**

**STEP 3: Begin Implementation of Highest Ranked Alternatives**

**STEP 4: Evaluate Results Against Performance Metrics**


**STEP 5: Adjust Program and Implement Additional Alternatives**





## Standardized Data Collection Modules

- Background Information
- System Summary
- Labor
- Maintenance and Repair Management
- Transfer Equipment (pumps, blowers, etc.)
- Instrumentation (inputs)
- Control System
- Controlling Devices (outputs)
- SCADA and Operator Interface
- Management Systems
- Detailed Cost Data
- Monitoring
- Well and Trench Systems
- Specific Problems/Desired Improvements



## Example Data Collection Module

Module 1—BACKGROUND INFORMATION		Page _1_ of _2_
Facility / Site Name: Vineland Chemical Co. Superfund Site		
		Inspector: R. Cronic
<b>A. Facility</b>		
Vineland Chemical Co. Superfund Site		1405 N. Mill Rd. Vineland, NJ 08360 Cumberland Co.
<b>B. Location</b>		
<b>C. Key Contacts:</b>		
Name and Title	Address	Contact Information
Dave Herwig Program Manager	Vineland Chemical 1405 N. Mill Rd. Vineland, NJ 08360	Phone: 856-690-1758 Fax: 856-690-1759 E-Mail: daberwig@voicenet.com
Steve Gillespie Site Manager	Vineland Chemical 1405 N. Mill Rd. Vineland, NJ 08360	Phone: 856-690-1758 Fax: 856-690-1759 E-Mail: vineland@voicenet.com
Chuck Van Winkle - Plant Superintendent/Head Operator	Vineland Chemical 1405 N. Mill Rd. Vineland, NJ 08360	Phone: 856-690-1758 Fax: 856-690-1759 E-Mail:
Bill Stappferne Maintenance Supervisor	Vineland Chemical 1405 N. Mill Rd. Vineland, NJ 08360	Phone: Fax: E-Mail:
Matthew Westgate Geologist/Project Manager	U.S. EPA, Region II Emergency/Remedial Response Div. 290 Broadway - 19th Floor New York, NY 10007-1866	Phone: (212) 637-4422 Fax: (212) 637-4422 E-Mail: westgate.matthew@epamail.epa.gov
Martin Connolly, Project Engineer	USACE Philadelphia District Vineland Project Office 1509 North Mill Rd. Vineland, NJ 08360	Phone: (856) 794-0925 Fax: (856) 794-9828 E-Mail: Martin.J.Connolly@nap02.us
<b>D. General Notes (Facility mission, history, risk issues, land use, political issues, etc.):</b>		
Site soil and groundwater impacted by arsenic related to historical production of organic arconical herbicides and fungicides since 1949. No. 42 on NPL list. RI/FS completed in 1988. Contaminants of concern are primarily organic (mono and di-methyl arsenic) and inorganic arsenic. Approximately 1 M gpd of groundwater is captured by 13 groundwater extraction wells. Treatment consists of chemical treatment by oxidation, coagulation, sedimentation, filtration, and precipitation. Treated water is discharged to Blackwater Branch under a NPDES permit.		

## Example Life Cycle Cost Analysis Backup Table

Cat #	Current Labor Costs			Rate (\$/hr)	total hours	Unit Cost	Units per year	Annual Cost
	Category	Crew	Description of Work					
1	Operations	1	Pumping of well vaults - 2 persons, 1 day per week.	35.00	16	\$ 560.00	52	\$ 29,120.00
	Operations	1	Note: Cost savings related to more efficient repair of flow meters are accounted for in Section 3.11, and savings due to reduced cleaning of discharge lines	35.00		\$ -		\$ -
	Monitoring		are included in section 3.4	35.00		\$ -		\$ -
	Admin.			65.00		\$ -		\$ -
	Engineering			65.00		\$ -		\$ -
	SubTotal				16.0	\$ 560.00		\$ 29,120.00
Cat #	Current Cost of Operations - Equipment and Subcontracts					Unit Cost	Units per year	Annual Cost
	Category							
1	Analytical							\$ -
	Subcontracts		Sludge disposal - 3 bbls X 52 wks X \$ 14/lb			\$ 22.00	1	\$ 22.00
	Utilities							\$ -
	Chemicals							\$ -
	Equipment							\$ -
	Materials							\$ -
	Supplies		Misc - Sump pump, truck, etc.			\$ 10.00	52	\$ 520.00
	SubTotal					\$ 32.00		\$ 542.00
Cat #	Proposed Operations Labor Costs			Rate (\$/hr)	total hours	Unit Cost	Units per year	Annual Cost
	Category	Crew	Description of Work					
3	Operations	1	Periodic pumping of well vaults - 2 persons, 1 day per month	35.00	16	\$ 560.00	12	\$ 6,720.00
	Maintenance			35.00		\$ -		\$ -
	Monitoring			35.00		\$ -		\$ -
	Admin.			65.00		\$ -		\$ -
	Engineering			65.00		\$ -		\$ -
	SubTotal				16.0	\$ 560.00		\$ 6,720.00

## Example Life Cycle Costing Analysis Summary Table

Life of the facility in years =		30		Date Prepared:		02-Aug-01		
Discount Factor in percent =		6%		Prepared by:		R. Cronic		
Project: Vineland Chemical								
Alternative Name:		Evaluation of Well Vault Monitoring and Maintenance						
Description of Alternative:		Site grading for surface water control. Sealing of interior vault seams. Replacement of concrete covers with lighter doors.						
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Cost Category	Est. Cost of Current Operations (Annual)	PW of Current Operations	Est. Cost of Proposed Operations (Annual)	Capital Cost of Proposed Alternative	PW of Proposed Operations	Annual Operating Cost Savings	Potential R O I (Years)	Potential Life Cycle Savings
	Note 1	Note 2			Note 3	(Col. 1 - Col. 3)	(Col. 4 / Col.1)	(Col. 2 - Col. 5)
Labor Operations	\$ 29,120.00	\$ 400,831.88	\$ 6,720.00	\$ 11,200.00	\$ 103,699.67	\$ 22,400.00		\$ 297,132.22
Maintenance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Monitoring	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Administration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Engineering	\$ -	\$ -	\$ -	\$ 520.00	\$ 520.00	\$ -		\$ (520.00)
Analytical	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Subcontract	\$ 22.00	\$ 302.83	\$ -	\$ -	\$ -	\$ 22.00		\$ 302.83
Utility	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Chemicals	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Equipment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Materials	\$ -	\$ -	\$ -	\$ 20,000.00	\$ 20,000.00	\$ -		\$ (20,000.00)
Supplies	\$ 520.00	\$ 7,157.71	\$ 120.00	\$ 500.00	\$ 2,151.78	\$ 400.00		\$ 5,005.93
		\$ -			\$ -	\$ -		\$ -
Totals	\$ 29,662.00	\$ 408,292.42	\$ 6,840.00	\$ 32,220.00	\$ 126,371.45	\$ 22,822.00	1.41	\$ 281,920.98
Note 1: Based on present estimated annual costs impacted by this alternative only. Note 2: The present worth of annual costs are based on a facility life and discount factor listed above. PW Factor = 13.76483115								

## Example Summary of Alternatives Cost Analysis

Program Element	Alternative Evaluated	Initial Cost	Annual Cost Savings	Life-Cycle Savings <sup>1</sup>	Return on Investment (years)
Well Field Management for Flow Maximization	Redevelop 14 RW's, reconstruct RW-9, and hydrogeologic testing of two RW's	\$173,000	N/A	\$1,765,950	N/A
Fouling of Groundwater Extraction Pumps	Addition of automated sequestering agent system.	\$36,000	(\$43,538)	(\$635,293)	(0.8)
Performance of Groundwater Influent Lines	New transfer main	\$288,360	\$19,360	\$69,000	15
Well Vault Monitoring and Maintenance	Replace covers, seal vaults, and grade area.	\$32,200	\$22,822	\$281,920	1.4
Hydraulic Capacity of the Treatment Plant	Add level control for coagulation tanks	\$7,040	\$550	\$500	12.9
Performance Enhancement Through Flow Equalization	Addition of equalization tank system	\$156,500	\$51,300	\$549,635	3.0
Chemical Usage Rates	Optimization of current protocols, eliminate second organic train, chemical elimination, and addition of polishing unit.	\$296,093	\$337,068	\$4,343,585	0.9
Performance of DAF Units	Modify discharge pipe weir and add internal sludge collection pipes.	\$25,660	\$24,500	\$311,647	1
Performance of Chemical and Polymer Feed Pumps	Replace existing pumps and add two new chemical dilution stations.	\$25,000	\$4,300	\$34,200	5.8
Performance of Flow Meters	Replace well flow meters with magnetic	\$27,300	\$10,920	\$123,012	2.5
Compressed Air System	Add third compressor.	\$15,600	\$1,875	\$10,195	8.3
Sludge Dewatering and Management	Replace centrifuges with filter presses	\$280,500	\$96,300	\$1,045,400	2.9
Installation of MOVs in Chemical Storage Facility	Install motor operators on valves	\$64,175	\$315	\$0	>30
SCADA System – Well Field Control and Operations Monitoring	Implement SCADA well field control and monitoring	\$45,660	\$6,370	\$42,022	7.2
SCADA System – Treatment Plant Control and Operations Monitoring	Implement integrated plant control and monitoring	\$104,200	\$28,600	\$289,474	3.6
SCADA System – Operator SCADA Control of Chemical Feed Rates	Integrate chemical feed rate control into PLC	\$50,000	\$25,662	\$303,233	2.0
PLC and VFD Maintenance and Obsolescence	Perform VFD survey and substitution design	\$6,200	\$0	\$0	N/A
Environmental Monitoring – Well Field Monitoring	Optimize sampling frequency and install dedicated sampling pumps	\$124,500	\$63,440	\$748,741	2.0
Environmental Monitoring – Treatment Plant Monitoring	Reduce frequency of two off-site sampling parameters	\$19,500	\$11,720	\$141,824	1.7
Data Management and Reporting	No opportunities for improvement identified	N/A	N/A	N/A	N/A
<b>TOTAL</b>		<b>\$1,296,873</b>	<b>\$657,778</b>	<b>\$9,696,354</b>	<b>1.05</b>